APPARATUS, MEANS AND METHODS FOR AUTOMATIC
COMMUNITY FORMATION FOR PHONES AND COMPUTER NETWORKS

FIELD OF THE INVENTION

    The present invention relates generally to Internet
search systems and a permission-based system to
automatically match people using a computer or a phone
based on their use of same or similar search terms.

5

BACKGROUND OF THE INVENTION

    One of the most important uses of the World Wide Web
(Web) is to search out information contained in one or more
servers on the Web. The problem is that the information

10 contained on those servers, while currently totaling over
one billion pages is often not the information a searcher
might desire nor is it in a format that the searcher can
utilize. Hence, people still need to "call up" other
people to figure out how to do something, find something,

15 some person or some information. Person to person
communication has not been outmoded and will continue to be
important in the coming years. This is especially true in
large organizations of 30,000 employees and larger where
the proverbial left hand and right hand do not know what

20 each is doing. As a result there can be costly duplication
of effort. With their permission, this invention
automatically matches of two or more persons on the
Internet or an intranet in a large organization for the
purpose of the creation a community of interest about a

25 specific topic, product, process, place, person, team,
organization, news item, job, project, technology and so
forth.

2

This invention has benefit to the human resources of an organization in that these matches help build connections amongst people and teams within the larger organization - promoting a generous and lively atmosphere
5   in which the whole is greater than the sum of its parts.

This invention also relates generally to computerized searching of large electronic databases or telephonic systems, wired or wireless, for an automatic electronic
10   community formation system that creates new communities with chat and other community functions. The invention finds matching search terms and invites the searchers to join. The present invention applies to telecommunication networks, the Internet, local area networks, wide area
15   networks, intranets, extranets, and standalone computers.

The Internet presents the dual problems of information overload and a dearth of human contact and wisdom. This lack of human contact has helped to foster the popularity
20   of online chat, bulletin boards and online communities such as Motley Fool, the Yahoo Clubs, The Well, Nyx, Metropolis, MUDs, PPP/SLIP, Usenet Newsgroups, IRC, Pics OnLine, PcBoard, GeoCities.com, and Tripod.com.

25   The lack of wisdom comes from the lack of quiet contemplation and discussion before large-scale action is undertaken. Before decisions are made, the wisdom of experience and analysis can be tapped with the aid of this invention. Which road to travel is often more important
30   than the speed one drives - especially if a wrong turn is thus avoided.

3

Large corporations, non-profits and governmental organizations have grown to value the enhanced efficiencies that arise from collaboration and knowledge sharing. Hence the growth of networked computers and applications such as

5   IBM's Lotus Notes. For instance, a multi-national manufacturing and service company with branches in a multitude of countries may find it has a failure of communication. Its corporate leaders and teams might lose touch with what other teams and individuals are working on.

10 They would appreciate a permission-based system that allows employees to find others who have similar interests.

Likewise, government, quasi-governmental agencies like NIST, CDC, FDA, NAS, NRC, the Executive Branch in general,

15 a large non-profits can grow to be so large that people engaged in similar work can remain unknown to each other, resulting in costly duplication of effort, time and resources.

20 There is to the inventor's knowledge currently no tool that allows people to be matched based on their search strings. This will help identify growing areas of organizational interest. To serve this need there are at least two companies who have products that search all the

25 email and create a knowledge map of who is working on what topic with their permission. This present invention is helps individuals connect earlier in their thinking and is less intrusive than a search of everyone's email.

30 Electronic networks (e.g., the Internet) provide a number of services for its users. The primary services relevant to this patent application are communities or

4

stand alone chat rooms, bulletin boards, list serves, electronic mail (email) and databases.

One of the major driving forces in the growth of
5   networks in general and the Internet in particular has been the way it facilitates people's ability to find others of similar interests. Chat, bulletin boards, date matching services and list services are among the most popular activities on the net. People have a need to meet people
10 and overcome the limitations of their physical separation.

However, the two main weaknesses of these existing systems is that they (1) require users to answer a number of questions and (2) these questions are limited to what is
15 known about the present or past but not easily adaptable to new developments in the future. Such systems would by their nature are basically fixed and limit the matches to the predetermined records and fields of the profile. If the participants or designers of the existing matching
20 systems fail to anticipate a new topic, issue, fact or future then a matching cannot occur.

SUMMARY OF THE INVENTION
The invention covers the apparatus, means and methods
25 for automatically matching based upon the search terms entered into a telecommunications system, the Internet (World Wide Web), standalone computer, intranet or extranet. Further, it provides a means and method of comparing that search with prior search terms entered by
30 others to make a match between similar searches – without needing to pre-determine a need to track this term a priori. After making a match the invention automatically

5

invites the matched parties to join a frictionless and
immediate electronic community if they so desire. These
communities may be as small as just two and as large as
tens, hundreds or thousands of participants.

5

Who will benefit from this invention? People who are
having trouble utilizing their new product purchase, such
as a computer or telescope and would like to talk, chat, or
email with someone who has bought the same or similar

10   product earlier and figured out how to use it. Also,
someone researching a rare disease and seeking a medical
expert might use this invention with life saving results.
Or for emotional reasons a user might want to communicate
with someone who has had the same experience of relative

15   dying or going through a divorce or layoff.

What else exists today that provides a portion of the
functionality of the intention? Currently such Internet
destinations as ICQ, AOL and other chat rooms, list serves,

20   and Usenet groups are set up around a particular topic.
These are collected and administered or archived by Yahoo,
ICQ, AOL, Topica and Google to name a few.

The problem is that there typically needs to be a

25   critical mass of 5-500 users to provide enough people to
cover a wide range of questions that might be asked on any
given topic. This invention only requires that there be as
little as two people who have a similar interest. Even if
the earlier searcher is not currently looking for

30   information on this subject this invention "remembers" his
or her interest and automatically asks permission to make a
match with someone who is interested.

6

Who kind of searches work best with the invention?
The more specific the search the more targeted is the
results. For instance someone searching for "Jaguar" might
5   get matched to people interested in cars, a cat, a Florida
football team, a type of computer. So users who search for
"Jaguar 120" will only get matched with others interested
in that particular classic car model and not the jungle
animal.
10

List serves are one of the components of this system.
Email can be subdivided into one-to-one delivery and one-
to-many. One-to-many is supported by a list serve that
maintains a distribution list and postings from interested
15   individuals. The distribution lists send email directly to
the members of the list serve. An example of the one-to-
many email services is Usenet. Herein, we define the
"many" in one-to-many as a community. Questions on a topic
of interest to a community can be posed to members so those
20   users can solve problems. A key purpose of any community
is to provide users a way to ask for or share information
with other users. A problem with list serves is that there
may not be any current users who care or know about a
particular question or topic. Existing communities might
25   be too broad or simply not exist for a particular topic.

The web is a database distributed across many
computers. The various computers are connected
electronically via hyperlinks in the data itself. A
30   derivative service of the web is a means, described or
referred to as "a search engine," that enables users to
locate information in the distributed database. An object

of search engines is to help users find information on the Web. Users often times have difficulty obtaining information because the search engines find too much or too little relevant information. Users also have trouble
5   finding other people of similar interests.

The object of this invention is for users to combine the services of search, email, phones, fax and the web to form communities. The present invention is designed to
10 operate multiple modes: with a person using a standalone computer, with a computer that provides communication to users with an archival database, with a computer or phone handset on a data or telecommunications network, with a wireless phone, with automated agents.
15

Users can communicate with the computer via direct network connections, serial lines (e.g., a modem connection), or directly via a keyboard/monitor combination. Users may be identified using various means
20 including their email address, their login name, or other unique identifier; denoted their ID, or some combination of these. Other means of identifying users are possible and the present invention is not limited to those listed here

25   The initial interaction of the user with the computer or phone is to search for data. In the present embodiment of the invention, the data could be located on the computer itself, in distributed databases over a network connection, e.g., the Internet, intranet, extranet or over a telephone
30 system. The user performs a search utilizing natural language consisting of a series of keywords, phrases, or sentences, called a "search string." Other types of search

8

strings or search input are possible. The computer has
means to pass the search string or search input to a search
engine, which could be located on the computer itself or
remotely on the network.

5

The invention will take people matched by their search
string or voice input and if it finds a match offer them
the opportunity to enter an existing community or create a
new community. This will be a text, avatar (graphical
10   representation) or voice chat room for instant or real-time
conversation via text or speech. There could be a
"bulletin board" for posting asynchronous communication.
The community might contain useful links to information,
goods and services. The community will provide users with
15   user preferences to control the look, feel and
functionality of the community. For example users may not
want a chat room and only want a bulletin board. Users may
or may not want to shop from a community. Users may or may
not want the community to suggest links to information,
20   goods and services. The invention gives users control over
these details.

The computer also contains a storage mechanism (e.g.,
a disk) on which a database is maintained. In the present
25   embodiment of the invention, there is a database. This
database provides a method of keeping track of search
entries and who made those searches. The database
maintains a set of entries containing the user ID, an
associated search string, and a name or names of a relevant
30   community(s).

A community is a gathering of two or more people,

9

virtual people or intelligent agents. A community contains
a text or voice chat room and a bulletin board and useful
links.

5   When the user uses this invention s/he enters a search
string consisting of a word or a phrase and the search
string is saved into the database, the community field is
set to an empty string, denoted null. The invention then
attempts to make match between a current search by one
10   person and previous searches by one or more other
person(s). The invention can also attempt to locate
(match) a current search string with existing communities
on the Internet, a telecommunications system or elsewhere.
These existing communities might have been set up
15   previously by the invention or exist elsewhere on a
network. The invention stamps the time and date of the
search. In a preferred embodiment of the invention, the
database is routinely purged of entries older than a
specified date.
20
Matching telephone or Internet users based on any
search terms with anyone else in the world subscribing or
otherwise able to access this invention creates
frictionless worldwide voice- or data-based communities
25   assembled in real-time with little or overhead or
bureaucracy.

Users are not required to enter ahead of time a
profile or any information about themselves. It is possible
30   but not required to gather contextual information from the
larger universe of identifiers that indicate this person is
a member of a consumer, chemical, electronics, scientific,

10

engineering, arts, social services, other industry
verticals, or indicators of other broad categories about
the type or nature of the user. For example, this
information can be derived from their passage through a
5   hierarchical search, a password, name of their originating
site or the domain of the user.

A preferred embodiment of the invention should give
users the ability to simply turn off the matching feature
10 from their computer, browser or telephone. Also the
invention can provide for levels of permission and levels
of security. Likewise, an embodiment of the invention
allows the users to specify the age of search matches. For
example, a user might ask that no search match older than 6
15 months occur and another user might insist that no match
older than 3 weeks be made.

After the user has entered his/her search string, the
computer checks all other entries in the stored database to
20 see if the present search string matches a previous search
string in the database. This database incorporates one or
more of the following methods: words in a database (with
triggers or without), a hash table (faster but more memory
intensive), a flat text file, an associative array (built
25 on top of a hash table), or rules in a forward-chaining
production system (fast but memory intensive). This same
invention can be used on a telephone via sounds with
associated meaning stored by a voice to text software
program to the invention, such as Naturally Speaking or Via
30 Voice. This enables the present invention for use on a
data network and, or, telephone system to facilitate making
matches over analog, digital or mixed phone and computer

11

systems.

The mechanisms for implementing matching for a search
string include the following methods: simple string match –
5   does a word or series of words in the query match an item
in the stored database within the system; a weighted string
match – for each word in the query assign points to items
in the system based on an inverse overall frequency score
so that 'rare' words get higher scores than common words
10   and return the items with the highest overall scores.

On these match methods the invention incorporates a
number of methods as follows: closeness, increase the score
where words matching in the item are close to each other in
15   the query and/or item; thesaurus expansion: expand search
words by adding synonyms; thesaurus inclusion, add synonym
cross-reference to indexing mechanism instead of adding
them to the search string; sounds-like: base search on
soundex or similar codes instead of words; soundex-enhanced
20   thesaurus: add words or cross-references based on synonyms
of soundex-expansions; syntactic connectedness: increase
the score where the words fall on the same branch of a
parse tree (using any of several parsing methods); semantic
connectedness: replace the syntactic parse with semantic
25   analysis, based, for instance, on CYC technology or simpler
forms of transformational analysis.

If a match is made, then one of two actions are taken
depending if the community field in the matched record is
30   null.

The **first action** is to consider the case of a null

12

community entry. The invention contacts the currently
searching and the previously searching users and asks them
if they want to join a new community on the topic of the
search string in the following manner. Initially the
5   current searching user is contacted by the invention
automatically. If that person indicates their interest in
joining a community then the **second action** of the invention
is to locate non-searching user(s) in the matched field and
contacted them and ask if they want to join this community.
10   If each answers in the affirmative, the invention
automatically asks permission to form a new community and
if the permission is granted the users are entered as
members of that community.

15   The invention picks a name for the community that the
users can later change. The name of the community is
inserted into the database in the records of the present
user and the matched user(s).   Both the currently
searching and the formerly searching users must agree to be
20   in the community and the nature of the community, e.g.,
whether the community will be open to others or a closed
confidential community. Another embodiment of the
invention matches a searching user with members of existing
communities found outside the invention but existing on a
25   telephone system, the Internet, an intranet, extranet or
standalone computer.

         A community for the invention is defined as a list of
two or more users that wish to communicate with each other
30   based upon matching words of a search string. The matched
search string or variation identifies the list. The list
contains the telephone number or email addresses of the

users. Users can remain anonymous if they so desire.

In the case of a non-null community entry, after the
match is made only the present user is invited to join the
5   already existing community. If the user answers in the
affirmative, then the present user is added by the
invention to the list for that extant community. The name
of the community is added to the database for the present
user. While the above text describes the primary
10 embodiment of the invention, additional variations are now
described. When matches are attempted, the invention adds
contextual information to the user's search string. Users
have input and output via telephone, email, a person, fax,
surface mail, or web-based email.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention together with the above and other advantages may best be understood from the following detailed description of the embodiments of the invention illustrated in the drawings, wherein:

FIG. 1 is a block diagram of the invention and its relationship to the Internet or an intranet or a telephone system, the computer, the search engine, a listserve, a database server.

FIG. 2 is a block diagram of the E-COMMUNITY DATABASE showing various records, e.g., Record 1, Record 2,..., Record i

FIG. 3 is a block diagram of Record i [Required information] and indicating the User ID, Search string, Community

FIG. 4 is a block diagram of Record i [Optional information] with the date/time, context, scope measure, matching disable, anonymity, match age of request

FIG. 5 is a block diagram of the record 1 after a sample search by dan@buzzit.com for "Boston Red Sox" User ID: dan@buzzit.com, Search string: "Boston Red Sox", Community: Null

FIG. 6 is a block diagram of the record 2 after search by carl@myisp.com for "Boston Red Sox"

User ID: carl@myisp.com, Search string: "Boston Red Sox", Community: Null

FIG. 7 is a block diagram of the Records 1+2 after dan@buzzit.com and carl@myisp.com agree to form a community: "Boston Red Sox" with Records 1 and 2: Record 1, User ID: dan@buzzit.com, Search string: "Boston Red Sox", Community: "Boston Red Sox"

Record 2, User ID: carl@myisp.com, Search string: "Boston

Red Sox", Community: "Boston Red Sox"

FIG. 8 is a block diagram of the Listserver after dan@buzzit.com and carl@myisp.com agree to form community "Boston Red Sox", Community: "Boston Red Sox", Members:

5   User ID: dan@buzzit.com, User ID: carl@myisp.com

DETAILED DESCRIPTION OF THE INVENTION

        Electronic networks (e.g., the Internet) provide a

10   number of services for its users. The primary services relevant to this patent application are communities or stand alone chat rooms, bulletin boards, list serves, electronic mail (email) and databases.

FIG. 1.

15   One of the major driving forces in the growth of networks in general and the Internet in particular has been the way it facilitates people's ability to find others of similar interests. Chat, bulletin boards, date matching services and list services are among the most popular

20   activities on the net. People have a need to meet people and overcome the limitations of their physical separation.

FIG 2.

        However, one of the weaknesses of these existing

25   systems is that they require users to either (1) enter a pre-defined gathering space or answer questions or (2) create a pre-determined profile. Such previous systems would by their nature limit the matches to the predetermined records and fields or a profile. If the

30   participants or designers of existing matching systems fail to anticipate a new topic, interest or future need matching cannot occur.

This patent covers the apparatus, means and methods for automatically matching based upon the search terms entered into a telecommunications system, the Internet

5   (World Wide Web), standalone computer, intranet or extranet. Further, it provides a means and method of comparing that search with prior search terms entered by others to make a match between similar searches – without needing to predetermine the basis for the match. After

10   making a match the invention will invite the matched parties to join a frictionless and immediate electronic community if they so desire. These communities may be as small as just two people and as large as tens or hundreds of thousands of participants. FIG.s 3-4

15
     Who is benefited from this invention? People who are having trouble utilizing their new product purchase and would like to talk, chat, or email with someone who has bought the product earlier and figured out how to use it.

20   Someone researching a rare disease and seeking a medical expert might use this invention with life saving results.

     What else exists today that provides a portion of the functionality of the intention? ICQ, AOL and other Chat

25   rooms, List serves, and Usenet groups are set up around a particular topic and these list serves are collected and administered or archived by Yahoo, ICQ, AOL, Topica and Google to name a few. The problem is that there typically needs to be a critical mass of 5-500 users to provide

30   enough people to cover the wide range of questions that might be ask on any given topic. This invention only requires that there be as little as two people who have a

similar interest and even if the earlier searcher is not
currently looking for information on this subject this
invention "remembers" his or her interest and offers to
make a match.

5

Who kind of searches work best with the invention?
The more specific the search the more targeted is the
results. For instance someone searching for "Jaguar" might
get matched to people interested in cars, a cat, a Florida
10   football team, a type of computer. So users who search for
and XKE Jaguar acceleration will only get information about
that car and not the jungle animal. In the preferred form
of the invention a search is context sensitive and
indicates the general area of desired information – the
15   context of the search and the user can control the nature
of the search. The user can look for prior searches based
on time of search or number of similar searches. FIG. 5

List servers are one of the components of this system.
20   Email can be subdivided into one-to-one delivery and one-
to-many. One-to-many is supported by list servers that
maintain distribution lists. The distribution lists can be
edited electronically by sending email directly to programs
that maintain the lists. An example of the one-to-many
25   email services is Usenet. Herein, we define the "many" in
one-to-many as a community. Questions can be posed to
community members so those users can solve problems. An
object of a community is to provide users a way to ask for
or share information with other users. Users who use a
30   list serve or chat room often times cannot find communities
to pose questions. Existing communities might be off-topic
or too broad, or might not exist for a particular topic of

18

interest.

The web is a database distributed across many computers. The various computers are connected electronically via hyperlinks in the data itself. A derivative service of the web is a means, described or referred to as "a search engine," that enables users to locate information in the distributed database. An object of search engines is to help users find information on the Web. Users often times have difficulty obtaining information because the search engines find too much or too little information. Users also have trouble finding other people of similar interests.

The object of this invention is for users to combine the services of search, email, phones, fax and the web to form communities. The present invention is designed to operate in person using a standalone computer, or a computer that provides communication to users with an archival database, interface to a phone handset on a telecommunications or data network, a wireless phone, automated agents and an electronic list server.

Users can communicate with the computer via direct network connections, serial lines (e.g., a modem connection), or directly via a keyboard/monitor combination. Users may be identified using various means including their email address, their login name, or other unique identifier; denoted their ID, or some combination of these. Other means of identifying users are possible and the present invention is not limited to those listed here

The initial interaction of the user with the computer
is to search for data. In the present embodiment of the
invention, the data could be located on the computer
itself, in distributed databases over a network connection

5   (e.g., the Internet, intranet or extranet) or over a
telephone system. The user performs a search utilizing
natural language consisting of a series of keywords,
phrases, or sentences, called a "search string." Other
types of search strings or search input are possible. The

10 computer has means to pass the search string or search
input to a search engine, which could be located on the
computer itself or remotely on the network.
FIG 6.

15 The invention will take people matched by their search
string or search input and offer them the opportunity to
enter an existing community or create a new community
consisting of a text or voice chat room for real-time
conversation via text or speech and a bulletin board. The

20 community can also contain useful links to information,
goods and services. Also the community will provide users
with preferences to modify the look, feel and functionality
of the community. For example users may not want a chat
room and only want a bulletin board. Users may or may not

25 want to shop from a community. Users may or may not want
the community to suggest links to information, goods and
services. FIG. 7

30 The computer also contains a storage mechanism (e.g.,
a disk) on which a database is maintained. In the present
embodiment of the invention, there is database. This
database provides a method of keeping track of search

20

entries and who made those searches. The database
maintains a set of entries containing a user ID, an
associated search string, and a name or names of relevant
community(s). And it will contain a record of those
5   wishing to be matched on any given search. A community is
a gathering of two or more people, virtual people or
intelligent agents. A community contains a text or voice
chat room and a bulletin board and useful links. FIG. 8

10   When the user enters a new search string and the
search string is entered into the database, the community
field is set to an empty string, denoted null. The
invention will attempt to make match between a current
search by one person and previous searches by one or more
15   other person(s). The invention will also attempt to locate
(match) a current search string with existing communities
on the Internet, a telecommunications system or elsewhere.
These existing communities might have been set up
previously by the invention or exist elsewhere on a
20   network. The invention stamps the time and date of the
search. In a preferred embodiment of the invention, the
database is routinely purged of entries older than a
specified duration. FIG. 9

25   Matching telephone or Internet users based on any
search terms with anyone else in the world subscribing or
otherwise able to access this invention creates
frictionless worldwide voice-based or data-based
communities assembled in real-time with no bureaucracy.
30
Users are not required to enter profile information
about them. With permission, contextual information can be

21

gathered from a larger universe of identifiers such as industry verticals or other broad categories about the type or nature of the user. For example, this information can be derived from their passage through a hierarchical search, a

5   password, name of their originating site or the domain of the user.

A preferred embodiment of the invention should give users the ability to easily turn off the matching feature

10   from their computer, browser or telephone. Also the invention can provide for levels of permission and levels of security. Likewise, an embodiment of the invention allows the users to specify the age of search matches. For example, a user might ask that no search match older than 6

15   months occur and another user might insist that no match be older than 14 days.

After the user has entered his/her search string, the computer checks all other entries in the stored database to

20   see if the present search string matches a previous search string in the database. This database incorporates one or more of the following methods: words in a database (with triggers or without), a hash table (faster but more memory intensive), a flat text file, an associative array (built

25   on top of a hash table), or rules in a forward-chaining production system (fast but memory intensive). This same invention can be used on a telephone via sounds with associated meaning stored by a voice to text software program to the invention, such as Naturally Speaking or Via

30   Voice. This enables the present invention for use on a data network and, or, telephone system to facilitate making matches over analog, digital or mixed phone and computer

22

systems.

The mechanisms for implementing matching for a search string include the following methods: simple string match - does a word or series of words in the query match an item in the stored database within the system; a weighted string match - for each word in the query assign points to items in the system based on an inverse overall frequency score so that 'rare' words get higher scores than common words and return the items with the highest overall scores.

On these match methods the invention incorporates a number of methods as follows: closeness, increase the score where words matching in the item are close to each other in the query and/or item; thesaurus expansion: expand search words by adding synonyms; thesaurus inclusion, add synonym cross-reference to indexing mechanism instead of adding them to the search string; sounds-like: base search on soundex or similar codes instead of words; soundex-enhanced thesaurus: add words or cross-references based on synonyms of soundex-expansions; syntactic connectedness: increase the score where the words fall on the same branch of a parse tree (using any of several parsing methods); semantic connectedness: replace the syntactic parse with semantic analysis, based, for instance, on CYC technology or simpler forms of transformational analysis.

If a match is made, then one of two actions are taken depending if the community field in the matched record is null. The **first action** is to consider the case of a null community entry. The invention contacts the currently searching and the previously searching users and asks them

if they want to join a new community on the topic of the search string in the following manner. Initially the current searching user is contacted by the invention automatically. If that person indicates their interest in joining a community then the **second action** of the invention is to locate non-searching user(s) in the matched field and contacted them and ask if they want to join this community. If each answers in the affirmative, the invention automatically forms a new community and the users are entered as members of that community.

The invention picks a name for the community that the users can later change. The name of the community is inserted into the database in the records of the present user and the matched user(s). Both the currently searching and the formerly searching users must agree to be in the community and the nature of the community, e.g., whether the community will be open to others or a closed confidential community. Another embodiment of the invention matches a searching user with members of existing communities found outside the invention but existing on a telephone system, the Internet, an intranet, extranet or standalone computer.

In the case of a non-null community entry, after the match is made only the present user is invited to join the already existing community. If the user answers in the affirmative, then the present user is added by the invention to the list for that extant community. The name of the community is added to the database for the present user. While the above text describes the primary embodiment of the invention, additional variations are now

24